Notes on the behaviour of the Crimson Fruitcrow *Haematoderus militaris* near Manaus, Brazil, with the first nesting record for this species

by Andrew Whittaker

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The Crimson Fruitcrow *Haematoderus militaris* is one of the most spectacular of the large South American cotingas; yet its ecology and social behaviour are virtually unknown (Snow 1982). In the Manaus area, the first sightings of this species were made in 1979 from a 42-m tower in virgin *terra firma* forest some 50 km north of Manaus by Bierregaard *et al.* (1987), who reported initial observations of the bird's behaviour and display flight. This represented an extension of the previously known distribution in the Guianas, and Amapá and Pará in Brazil (Snow 1982). Subsequently, D. Stotz (pers. comm.) collected a specimen in Rondonia, some 1000 km southwest of Manaus.

The following observations were made over a five-year period (1987 to 1991) from the tower described by Bierregaard *et al.* (1987) or from the nearby forest reserves of the PDBFF (Projeto Dinâmica Biológica de Fragmentos Florestais). This region consists of a mosaic of *terra firma* forest and agricultural development (mostly cattle pastures) between 50 and 70 km north of Manaus. The forest here is found on nutrient-poor yellow latosols (Anon. 1978) and has a continuous, 35-m high canopy with occasional 40–55 m single emergent trees towering above the rest.

Almost all the sightings of *H. militaris* were of single birds. They were located by checking exposed perches in large open-topped emergents or by following their short, low-pitched *bock* calls. The birds were always observed in the canopy and for this reason a clearing or tower greatly improved the chances of seeing them. The call is normally repeated at irregular intervals of several seconds. Imitation of the call can sometimes bring the bird closer into the canopy above the observer. Vocal recordings by Bierregaard and Mario Cohn-Haft are archived at the Library of Natural Sound at Cornell University, and at the Instituto de Bioacústica at the University of Campinas, in Campinas, São Paulo.

As with Bierregaard *et al.* (1987), a high percentage (about 80%) of my records involved birds in adult male plumage. Only on five occasions were female-plumaged or juvenile birds seen. On one occasion an adult male was accompanied by two female-plumaged birds, and on another occasion by a single female-plumaged bird. The third sighting was of an adult male which was accompanied by a bird in a plumage similar to the juvenile plumage described by Snow (1982). The distinct vermiculated black and white tertials were conspicuous. The fourth record was of a female-plumaged bird attempting to catch a large flying insect, and the last record was an individual building a nest.

Only on the three occasions mentioned above was more than a solitary individual bird observed. The adult male and juvenile birds were observed together at 16.00 hrs on 28 March 1988. The male was seen sallying for insects from an emergent tree. It sallied for about 10–15 m at an angle of *c.* 45° in an unsuccessful attempt to catch a large unidentified flying insect, returning to the same perch as the immature bird. A few minutes later bill touching was observed. The pair (adult male and female-plumaged bird) were observed chasing each other through the canopy at the edge of a natural treefall clearing on 8 June 1987. The two birds then perched on the same branch, preened each other and touched their beaks for about a minute before they flew off calling until they were out of sight.

Snow (1982) states: "The male's courtship must be one of the most brilliant displays of all tropical American birds: to see it and describe it is a prize awaiting some future ornithologist". The first records of any display flights were recorded by Bierregaard *et al.* (1987). My two further observations provide a more detailed description of this cotinga's display.

The third record of two or more birds together involved three birds and was evidently part of the initial display. At 16.30 hrs on 14 September 1988, in the Agricultural District some 65 km north of Manaus, I was attracted to a group of three Crimson Fruitcrows by their typical calls. There were two female-plumaged birds and one male. They were perched on the edge of a 10-ha, isolated forest reserve separated on all sides from virgin forest by about 250 m of cattle pasture. The weather was still and sunny and all the birds were very close together in the top of a tall leafless tree in the corner of the reserve. The two female birds were 1 m apart and the male some 2 m below them. One of the females had an unusual plumage with the brown-black of the back extending onto the nape; the rest of the plumage was typical (black wings and tail, crimson body feathers). The male bird was puffed up with his specialized elongated feathers all erect, moving his head from side to side. He then held his head motionless at an angle with one eye fixed on the two birds above him, while the bird in typical female plumage moved closer to the other female. As the male displayed the latter bird flew off, calling once as it flew to the adjacent continuous forest. This bird was moulting its primaries. The male continued in its pose, opening his beak while moving his head from side to side. After about 6 minutes the female which had remained flew off over the clearing in the same direction as the first bird. The male returned his feathers to normal, and hopped around a little in the branches before also leaving silently across the clearing some 9 minutes later.

On 5 September 1988 the initial preparations for the display flight were observed at the Manaus observation tower. I saw a bird in male plumage at one of the regularly used perches in an emergent lecythidaceous tree. For some time it remained motionless in a partially exposed position. At 08.45 hrs it puffed out its very elongated upper breast feathers and erected its crest feathers; it started looking around more alertly, and over the next 10 minutes puffed up and erected its plumage five times. It then flew some 200 m over the canopy in its typical undulating, woodpecker-like flight to another emergent tree of the same species, some 80 m from the tower. As

it arrived, the bird performed a stall above the perch enabling it to drop more slowly some 50 cm, landing with its crest erect. On a later occasion, as the bird returned to its perch it again rose up in a stall and dropped toward the perch, but this time flapped up again above the perch into a final stall before alighting. It then hopped about the small branches in the emergent tree, moving its head from side to side.

The bird performed a display flight at 09.03. It climbed steadily at an angle of about 50–60° with its neck extended and wings beating rapidly with deep forceful wing-beats almost completely below the plane of the body. When it reached about 30 m above the tree-top it started a slow descent. During the descent the bird held its wings open above the horizontal in a v form, the tail was fanned out to act as a brake, and all its crown, upper and lower back and breast feathers were puffed out. This made the bird look rather like a great crimson rugby ball. As it reached the level of the tallest emergents it began a slow spiral down into the forest and out of sight.

Shortly after 09.12 the bird was relocated on one of its regular perches. During the following few minutes it appeared very agitated, changing perches several times and puffing out its breast feathers. At 09.26 it took off on another display flight as before, but on the descent it glided almost horizontally through the canopy for some 50–80 m before relaxing its plumage and returning to its undulating flight pattern. It landed about 200 m away in another emergent.

At 08.55 the next morning we again observed the display flight. One display, from leaving the perch on the upward climb to the landing, was timed and took 24 seconds. Again at 09.16 and 09.20 the bird was seen descending from display flights above different emergent trees. During these observations no other birds were seen and no vocalizations were heard.

At 13.00 on 4 April J. Stratford (pers. comm.) observed an adult male bird flying over the road and above the canopy of the *terra firma* forest near the reserves. Its flight pattern was noted as very unusual; it was flying in a normal horizontal plane but its body was held in vertical position, with the tail spread and the upper tail-coverts all erect and moving in the wind as the bird passed by. The bird then reverted to a normal flight pattern and flew into the forest and out of sight.

The diet of this species is still poorly known. During my field work I observed on several occasions individuals sallying for large flying insects, often looking clumsy in the attempt but nonetheless with success. Bierregaard *et al.* (1987) also recorded this from the tower on one occasion. R. Ridgely and G. Tudor (pers. comm.) also observed a sub-adult bird catching two cicadas in the canopy. The bird collected in Rondonia had only insects in the stomach (D. Stotz pers. comm.). The other two stomach contents reported by Snow (1982) also only contained insects.

There is nothing recorded about the nesting of *H. militaris*. At 07.25 hrs on 2 September 1991 repeated vocalizations brought my attention to the presence of a female-plumaged bird in a large tree on the edge of a 100-ha isolated forest reserve. The bird's plumage was identical to the female seen on 14 September 1988, with the brown-black extending onto the nape. She was shuffling about in a broody manner in a slight hollow

formed by a fork on a horizontal branch in the centre of the tree some 20 m high. She seemed to be arranging what I assumed to be a nest although nothing was visible from my position.

At 07.30 the female flew off silently over the clearing to some other trees along a stream some 250 m away. She returned at 07.50 directly to the nest site, making just one short vocalization. Again she shuffled about, sitting in a brooding position on the nest-site arranging something, although no nest-material was seen in the bill. During the next 3 minutes she called three times before leaving by swooping down into the cover of the nest tree and then off over the clearing in typical undulating fashion. She landed in an emergent tree before being lost to sight in the corridor of forest bordering the stream.

At 08.04 the female returned to a dead tree 20–30 m from the nest-site, where she called three times before flying to the nest. Again no material was visible. This time she move in a counterclockwise direction while sitting on the nest with her bill open, apparently arranging the nest-material. She flew off silently into the 100-ha reserve at 08.06. At 08.55 and 09.25 she visited the nest and called once; on both occasions she clearly had nest-material in her beak, apparently tiny rootlets and maybe a little mud. She settled onto the nest-site, shuffled around, arranged the material, and wiped her bill several times on the edge of the nest. On the second visit she remained standing up in the nest, and with her wings held open in a horizontal position she did one and a half clockwise rotations in the nest, pushing down the nesting material with her feet. Then she flew off over the clearing calling twice.

Further observations were made some 30 days later but there was no evidence of a bird in the vicinity of the nest, but only in the 100-ha reserve where a bird was heard to call. During a three-month ornithological survey of this 100-ha isolated reserve I recorded the species 12 times, mostly by vocalizations; only on two occasions were birds seen.

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Address: Andrew Whittaker, Projeto Dinâmica Biológica de Fragmentos Florestais (PDBFF), INPA Ecologia, Caixa Postal 478, 69.011 Manaus, AM, Brazil.